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Academics

# challenge

**BREAKTHROUGH**

*Social Sciences*



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# HUD Challenge

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**PAGE 4:** The primary objective of Operation BREAKTHROUGH is discussed together with the progress at each of nine sites and on each of the program's established goals.

**PAGE 9:** Operation BREAKTHROUGH Director, Arthur Newburg, discusses how Federal funds have stimulated investments by both the winners and those who decided to continue in the field without Federal assistance.

**PAGE 11:** One of the greatest single drawbacks to industrialized housing has been the cost of transporting the modules to the site from the factory. BREAKTHROUGH has succeeded in reducing these rates.

**PAGE 23:** A wide variety of families moved into New Horizon Village, the BREAKTHROUGH site in Kalamazoo, Mich., this spring and were welcomed by Secretary Romney.

**PAGE 27:** NAHB Chief Economist Michael Sumichrast looks at the housing picture over the past months and predicts what it will be for the rest of 1972.

## NEXT MONTH:

Articles on condominiums/cooperatives and a method of converting dilapidated public housing into a lively, safe community of involved, concerned tenants.

**COVER:** As Operation BREAKTHROUGH has stimulated the production of industrialized housing and the public's interest in it, modules being lifted into place by cranes have become familiar scenes on both prototype sites and projects using the modular building systems.

# looking ahead

## Community Development Fund

The American Institute of Architects has proposed that a Community Development Fund replace the present Highway Trust Fund. The proposal was made to the House Public Works subcommittee on roads by AIA Vice President Archibald Rogers who argued that a community development fund would be not only multi-modal in the transportation sense, but would be available to fund public infrastructures of all kinds. In AIA's view, the fund should be flexible: used to create and repair the public infrastructure, provide planning and capital monies to State and metropolitan governments, allow local political units to assign their own priorities, and strongly support local metropolitan planning and development."

## Computerized Information Files

The Urban Development Information System (UDIS), developed by Fairfax County, Va., under a HUD grant, will develop computerized information files for use in the county's planning functions, in preparing and analyzing rezoning reports, and in building an information bank which will help county officials as well as private interests decide how to make best use of the land. The county was originally awarded \$125,000 in November 1970 to test the project concept in a 15.9 square mile Springfield Planning District. An additional \$226,000 was awarded recently to enable the county to expand the system county wide. The UDIS system is based on assembling land use planning data from several county departments into one data base. The county will be able to use UDIS to forecast new housing and population patterns which will considerably aid detailed planning of public facilities. HUD's interest in UDIS lies in possible application of the system to other urban areas experiencing rapid growth and development. Information developed through the computer can serve to avoid costly mistakes in land use planning, and should also be helpful to private developers and other commercial organizations.

## More Corporations Will Enter Real Estate

Every major corporation in the United States will have entered some facet of real estate by 1980, says Market Analyst Sanford R. Goodkin. Real estate has reached the "state of legitimacy, no longer dependent on Uncle Sam for sustenance nor on FHA for insuring its marketability." Wall Street, predicts Goodkin, will be heavily involved in procuring equity dollars for any size project. The public will own key housing producers, syndications, and land banks. The Federal Government will limit participation to subsidized housing and new towns, but will help metropolitan and regional bodies fund land planning and land banking.

## HUD Initiates Utilities Study

A research program which could lead to new methods of servicing urban areas has been initiated by HUD with the cooperation of the U.S. Atomic Energy Commission and the National Aeronautics and Space Administration. The study—Modular-Sized Integrated Utility System (MIUS)—will investigate and demonstrate the feasibility of servicing communities of limited size with a complete range of utilities generated by a single processing plant. In most current urban development, separate systems are employed for supplying electrical and thermal energy to buildings. Water supply, liquid waste, and solid waste handling are generally treated as separate services. This conventional, fragmented approach is inefficient economically and environmentally, and limits the options for urban development and renewal. The new combined package approach would include electricity, heat, air conditioning, waste water and solid waste treatment, and water supply. These services would be available to clusters of dwelling units ranging from 100 to several thousand. In 10 years the potential market for MIUS is expected to stimulate the country's employment and productivity by \$80 billion.

## Live-In Megastructures

Industrial design students at Georgia Institute of Technology envision tomorrow's apartments as giant A-frame superstructures constructed over existing superhighways. Magnetic tracks provide transportation inside the structure. At the top of the A-frame would be a rapid transit system to move residents from home to downtown.

## Fly-Ash Bricks

West Virginia University has perfected the art of making bricks and other fired products out of fly-ash, a residue from coal-fired power plants. The first plant using the WVU process was recently constructed in Alberta, Canada. From an environmental point of view, fly-ash bricks will help prevent two serious land pollution problems—holes, caused when clay is dug for conventional bricks, and piles, formed when power companies dump their fly-ash. Fly-ash bricks are from 20 to 30 percent lighter than clay bricks. They are about equal in ranges of texture and color, and fly-ash bricks have an advantage in strength. The cost of manufacturing fly-ash bricks on a commercial scale is expected to be the same or slightly lower than for clay bricks.

# Operation Breakthrough a Progress Report

The primary objective of Operation BREAK-THROUGH was declared at the program's inception in May 1969—to modernize the housing industry by facilitating volume production of quality housing for people of all incomes. There were other objectives, of course, but this overall goal perhaps best states the purpose of the program.

Depending on your choice of critics, BREAKTHROUGH was immediately denounced as impractical, unnecessary—or even grandiose. And depending on your choice of supporters, the program was praised as practical, necessary, and a giant step in the right direction. Now, three years after its birth, BREAKTHROUGH is beginning to prove itself.

It has not been an easy task, and the 80 members of HUD's BREAKTHROUGH Central Office and field team will readily admit they encountered some unexpected problems. The complexity of the problems precluded an overnight transformation of the American housing industry, which had consistently rejected volume produced housing although it has been accepted by most other major nations in the world. BREAKTHROUGH has now, however, dramatically accelerated the acceptance of industrialized housing in America and made major inroads through the many institutional constraints which have traditionally hindered the industrialization of housing in this country.



## **Secretary Romney and Assistant Secretary Finger**

## BREAKTHROUGH's Phase I and II

Operation BREAKTHROUGH is a three-phase program. In Phase I, 22 Housing System Producers (HSP's) were chosen from over 200 competitors to participate in the program. The selected producers utilized housing systems ranging from precast concrete- or wood-framed modules to units constructed largely of plastic or metal. Some systems were already in production when selected while others were new and untested. Some of the producers were giant corporations. Others were firms. The idea was to produce the best possible balance of technical, financial, managing and marketing capabilities.

Following another national competition, additional contracts were awarded to 11 site planners, eight site developers, and 22 related research organizations as BREAKTHROUGH moved into Phase II—the prototype site development of more than 2,939 housing units. Two of the prototype sites were later eliminated because of budget restrictions, leaving Indianapolis, Ind.; Jersey City, N.J.; Kalamazoo, Mich.; King County, Wash.; Macon, Ga.; Memphis, Tenn.; Sacramento, Calif.; Seattle, Wash.; and St. Louis, Mo. The nine sites are located in downtown areas, built-up areas of cities and in suburbs. They range in size from 1.8 acres in downtown Seattle, to 50 acres outside Macon.

The planners on all nine sites employed a mixture of housing types to demonstrate the interplay of different systems and to encourage a harmonious mix of social and economic groups. The success of the latter goal is apparent at the Kalamazoo site where Secretary George Romney welcomed the first BREAKTHROUGH occupants to their homes in March. Occupations of these first families included waitresses and college professors. Racial diversity was as pronounced as economic background.

Work is now progressing rapidly on all of the nine Phase II sites. All sites, except for Jersey City, are scheduled for completion this year.

## Phase III

Under Phase III of Operation BREAKTHROUGH—the volume production stage—HUD has set aside funds for BREAKTHROUGH HSP's to build approximately 25,000 subsidized units—primarily rental and cooperative housing for low- and moderate-income families, Section 236. Originally it was anticipated that most of the Phase II prototype units would need to be completed on the nine sites before any of the Housing Systems Producers could move into the volume production of their units. This approach was found to be impractical. Many of the HSP's had tooled up for Phase II development and found it economically unfeasible to slow down production.

It is now expected that funds for the first 25,000 BREAKTHROUGH Phase III units can be processed by the end of June 1972. These units are scattered across the country and represent the same high standards and superior quality found on the nine prototype sites. Lessons learned during Phase II are being applied to Phase III developments.

With this very general and much simplified overview of Operation BREAKTHROUGH as a background, a

closer look can be taken at program accomplishments. The physical construction of BREAKTHROUGH housing is indeed important—but more important is the fact that BREAKTHROUGH in three short years has developed a framework for the manufactured housing industry of the future. The program has served as a catalyst to "break through" the constraints that have prevented industrialized housing from emerging as a major industry in this country. Restrictive building and zoning codes, labor practices, limitations on transportation, antiquated financial methods, and the absence of volume markets have previously stifled the industry. While eradicating these constraints is not complete, there is evidence of progress where there was no possibility for progress just three years ago.

## Labor

Encouraged by BREAKTHROUGH, the building trades have developed new forms of labor agreements for factory housing production. Under these agreements, lower skilled workers may be employed and opportunities are opened for minority workers and hard-core unemployed to find rapid training for meaningful work at industrial wage rates. At the same time these contracts assure the availability of field craftsmen for the onsite erection and finishing operations.

The now famous Tri-Trades Agreement of 1969 marked a BREAKTHROUGH milestone. For the first time national unions representing carpenters, electricians, and plumbers signed contracts allowing the construction of completed sections of light-frame houses at factories—and installing these housing units on BREAKTHROUGH sites. Similar landmark agreements by composite crews, organized by the International Laborers Union, accepted factory production of heavy-weight concrete building systems. Many Tri-Trades and Labor agreements have been concluded since the first landmark signing. Over 100 labor contracts of all types have been signed with the building trade unions for the factory production of housing on an industrialized basis.

There is every reason to believe that organized labor is willing and able to cooperate in the movement toward volume produced housing. Only with the continued support of the trade unions will BREAKTHROUGH's long range goals be achieved. And only with this support can the Nation move toward effective use of our full labor capacity at all levels of skills.

## Transportation

The highest quality factory produced house is useless unless it can be moved to its final destination at a reasonable cost. The Interstate Commerce Commission recognized this dependence of industrialized housing on effective transportation when it ordered a rollback in tariff rates for shipping modular housing over the Nation's highways in response to HUD's arguments.

BREAKTHROUGH has continued its efforts to reduce restrictions in the use of the rails and highways. Negotiations are underway with the Department of Transportation to reduce the maze of red tape involved with



Seattle



Indianapolis



Memphis



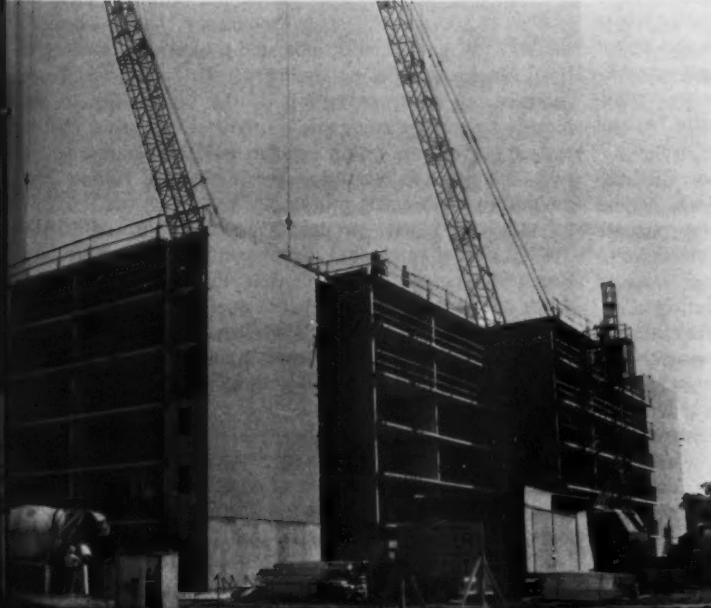
Kalamazoo



Macon



St. Louis



11

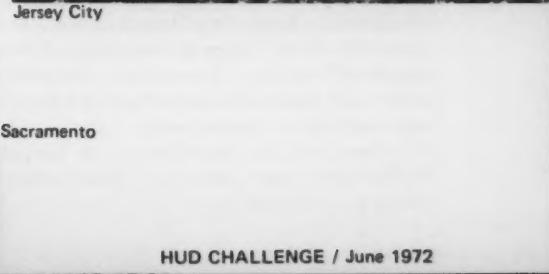
All but one of the nine Operation BREAKTHROUGH prototype sites are scheduled for completion in 1972. Public response to the BREAKTHROUGH homes at the completed Kalamazoo site has been overwhelmingly favorable, and sales have been brisk. Much of the work has been completed on the sites in Macon, St. Louis, and Sacramento, and work is now progressing rapidly in Indianapolis, Memphis, Seattle, and King County, Wash. The Jersey City site is scheduled for completion in mid-1973. Families have already moved into BREAKTHROUGH homes on the Kalamazoo, St. Louis, and Memphis sites.



King County



Jersey City



Sacramento

highway transportation of modules and with the Association of American Railroads to establish new and more reasonable rail transport rates. Railroads and rail equipment manufacturers are being urged to develop standardized hardware and equipment for shipping modular housing units and components.

#### Performance Criteria

Operation BREAKTHROUGH is unique in evaluating new housing methods and innovations based on performance. Most local codes—and even the most modern codes—do not provide for evaluating truly innovative building materials and methods. They are instead oriented to certain specified and familiar methods of construction.

With the expertise and cooperation of the National Bureau of Standards, Operation BREAKTHROUGH has developed a set of criteria based on performance. It evaluates standards of comfort and utility as well as the usual structural, electrical, and mechanical requirements. These criteria were reviewed by the National Academies of Science and Engineering and thoroughly tested in developing and evaluating the prototype housing systems. Industry-wide comment on these criteria is being obtained and will be carefully considered in continuing revisions.

The "Guide Criteria" do not constitute a building code, nor do they serve as a model code. They have developed as experimental design parameters based on performance—and they leave the door open to innovation. The message they seek to convey is a simple one: manufactured housing can more than equal the quality of conventionally constructed housing both in design and in utility. BREAKTHROUGH has proven it.

#### State Activities

Through Operation BREAKTHROUGH, State activities in housing have been encouraged. All 50 States have established a BREAKTHROUGH officer at the Governor's staff level. Many have established State-wide housing finance agencies or housing development organizations. In the case of some States—New York for instance—these agencies have broad powers to develop more and better housing throughout the State. This development is particularly impressive in the field of housing where traditionally the cities have worked directly with Federal agencies.

Nowhere is the success of Operation BREAKTHROUGH more evident than in the States which have passed industrialized housing laws or general purpose building codes allowing approval of manufactured housing. Twenty of the 50 States have passed such laws to date, and many others are considering similar action.

These laws preempt local regulations for housing which meets established State standards. They reassert the authority of the State in establishing building codes and regulations as part of the State in establishing building codes and regulations as part of the State constitutional responsibility for police power.

Prior to the introduction of Operation BREAKTHROUGH, there were no States with industrialized housing laws in effect.

#### Finance and Investment

The BREAKTHROUGH housing on the nine prototype sites is financed primarily through regular HUD channels. HUD Research and Technology funds have been used only in the so-called "prototypical" aspects of the construction. By seeking and achieving a broad involvement of financial institutions financing the nine prototype sites, BREAKTHROUGH has gained wide exposure for the high quality and sound design of the factory produced units.

In terms of money spent, BREAKTHROUGH is a modest Federal program. But major investments are being made by the BREAKTHROUGH housing system producers—investment stimulated and encouraged by the program. Approximately 17 new or converted plants have been initiated by the selected 22 HSP's since the beginning of BREAKTHROUGH. And it is significant to note that major investments are being made not only by the 22 winners of the national competition, but by the 220 losers as well. All but three or four of the semi-finalists and about two-thirds of the next ranked 150 entrants in the competition have continued in the industry even though they have received no help from Operation BREAKTHROUGH. Many of these producers have indicated that BREAKTHROUGH provided the stimulus for their entry or continued activity in the industrialized housing field.

The enormous investment by the private sector clearly indicates genuine confidence in the future of the industry and the continued growth of the factory housing market.

#### The Future

Operation BREAKTHROUGH is not a permanent program. It did not provide for further national competitions, nor will there be additional prototype sites. The program was intended to serve as a stimulant, and it has served its purpose well.

The BREAKTHROUGH program, with emphasis on volume production, new technology, and advanced methods of management, indicated a resolve to modernize the American housing industry. This goal is being achieved as more and more of the constraints to the industry are being overcome. Current efforts stress change and improvement within regular HUD programs, where such changes will encourage the increase of volume production in the housing process.

As the first occupants moved into BREAKTHROUGH homes at Kalamazoo, Mich., Secretary Romney repeated his prediction that by 1980, "two-thirds to three-fourths of all housing in this country will either be factory-built or will use prefabricated components." When this prediction is fulfilled, someone will recall that BREAKTHROUGH more than lived up to its name. 

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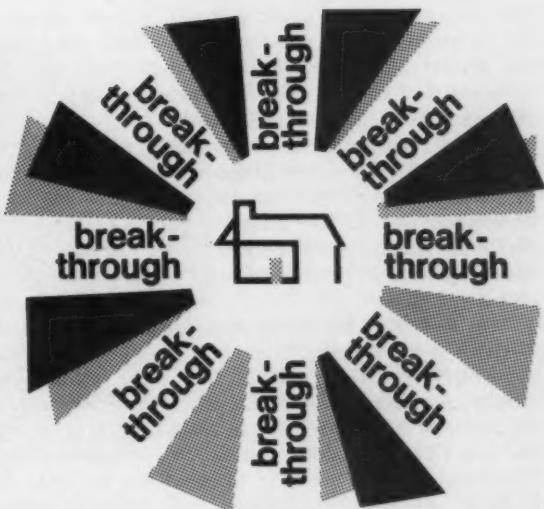
*Editor's Note: Stories providing additional information on specific aspects of Operation BREAKTHROUGH are found in the rest of this special issue.*

# Operation BREAKTHROUGH: Catalyst for Change

By Arthur S. Newburg



*Arthur S. Newburg is the new HUD Director of Operation BREAKTHROUGH. His past experience in housing includes a year as Vice-President and General Manager of Contemporary Homes of Philadelphia, Inc., a subsidiary of Techbuilt, Inc., and 11 years as owner of his own design and general consulting firm. This experience, coupled with his previous responsibility in Operation BREAKTHROUGH as Deputy Director, will help immeasurably in achieving the BREAKTHROUGH goals of removing remaining barriers to large scale production.*



When all of the particulars are forgotten, Operation BREAKTHROUGH will be remembered as a program that changed an industry. It is a classic example of how a relatively modest amount of Federal funds, used as a catalyst, can generate far larger forces to accomplish major public purposes.

Faced in 1969 with a national goal of 26 million more dwelling units in a decade, and an industry that had built 15 million in the prior decade, it was clear to Secretary Romney that major new sources of productive capacity had to be stimulated. No massive new infusion of dollars was in sight for a direct attack on the problem. And existing firms in the industry were usually local in character, small, undercapitalized, and thin in management. They were also beset with a growing scarcity of skilled craftsmen and key materials, plagued by a chaotic jumble of zoning and building regulations, and limited in their ability to introduce innovative or cost-saving techniques and products. There were no reasonable standards for evaluation and their workmen feared potential loss of jobs. In short, it was a fragmented industry that would be difficult to change swiftly enough to meet the Nation's housing goals.

Some within the industry had argued that if it was just given enough mortgage money it could do the job. But it was not clear that this was the case. The highest single previous production year reached only two million dwellings. Building costs were spiraling even faster than other parts of the economy. To pump large amounts of money into such a situation, without any easing of labor and material problems, could easily end in even greater

inflation, through heightened demand for the same scarce resources.

### BREAKTHROUGH as a Lever

With no major new funding in sight, a fragmented industry, and severe inflation, a new strategy was needed. Like Archimedes, HUD needed a fulcrum and a lever long enough to move the world of home building.

Operation BREAKTHROUGH was to be that lever. The program has two prime elements: a direct attack on the problems of production and innovation, and a flanking attack on the institutional constraints that had hindered the industry. Together these aim at improving the processes of the building industry.

The companies and technologies selected in the BREAKTHROUGH competitions have received the bulk of public attention. They are the most visible and easily understood part of the program. But HUD's efforts to overcome building constraints are even more important, because success in these areas helps all participants in the industry.

In a sense, the companies selected in BREAKTHROUGH are a means to an end. They provide us with the visible, specific examples that make possible the attacks on outdated codes and other problems. Without the technical questions raised by the fiberglass systems or the honey-comb sandwich system, for example, a code administrator could continue to assert that his code was perfectly adequate to evaluate any building system. Without the national attention focused by Operation BREAKTHROUGH on industrialized housing systems and the difficulties they face operating under multiple codes, there would have been a significantly smaller impetus to State legislators to act in this area. Without the specific transportation needs of particular building systems and the very real prospect of volume business from them, the railroads could not have been attracted to plan a new and significant role in transporting housing components. Without the specific examples of site planning at our prototype sites, we could not have drawn attention to the best current practices in land use. Without the need to evaluate objectively the innovative technology of the BREAKTHROUGH systems, it might have taken the industry another five or ten years to develop a complete set of performance criteria for all elements of a dwelling.

Thus, the specific examples of technology and housing systems that are the visible product of the program became the focus and tool for us to examine the institutional problems facing the whole industry. The systems gave a sense of urgency to what could have been purely theoretical arguments, had we attempted to work the problems of constraints more directly.

### Federal Funds

HUD funding for Operation BREAKTHROUGH is expected to total about \$65 million for its three years of operation, plus the follow-up studies planned for later years. This represents a significant increase over any previous funding levels voted by Congress for housing research. But it is still a very small amount, as Federal

operating programs go, particularly in view of its far reaching effects.

Some of the BREAKTHROUGH funds were used to assist research and development efforts of the 22 winners of the Operation BREAKTHROUGH contest. Other funds made up the difference between the expected higher cost of early production prototypes and the market and mortgage values of the units. The remaining, approximately 40 percent, went for research support efforts, including our contracts with the National Bureau of Standards, and National Academies of Science and Engineering, the site planners for our prototypes, our quality assurance contractor, our site construction managers, and many others who are providing technical assistance to the program.

The BREAKTHROUGH funds and promises of priorities in processing encouraged existing housing firms, and other firms new to the industry, to invest in a major effort to introduce new housing concepts capable of high volume production, improved quality, and controlled cost.

The investments of these BREAKTHROUGH participants already match or exceed any HUD investment. The impact of the program is so wide-spread that it is impossible at this point to assess the ultimate long term consequences. We can make some reasonable short term estimates. From the projections and information from our 22 BREAKTHROUGH producers, we expect that by 1975 they will have made plant and capital investment of nearly \$100 million.

Among the other housing system proposers who were not selected as winners (there were 235 applicants), the majority have continued in the industry without help from BREAKTHROUGH. We have estimated that this group will have an investment totaling approximately \$225 million by 1975.

There were also many firms who did not make proposals to Operation BREAKTHROUGH, but who nevertheless responded to its stimulus; many have described their progress to HUD. We estimate that firms in this category may represent another investment of \$200 million.

There are also many firms that have been drawn into the industry since the program started, have moved into the market place with their housing systems, and have invested in plants and equipment. Between firms who already have started and additional firms which can be expected to start by 1975, there will probably be another \$200 million of investments.

This would indicate that by 1975 BREAKTHROUGH should have stimulated direct investment of approximately \$725 million. There is no way to assess the secondary investment by subcontractors and other suppliers to these preliminary investors, nor does this include the value of housing units which will be produced by this new investment. But even the direct investment by 1975 will be over 11 times the \$65 million Federal investment in Operation BREAKTHROUGH. This is the effect of a true catalyst—a creative use of Federal funds to develop a cooperative effort between Government, industry, and labor to move an entire industry forward. ☺

# BREAKTHROUGH PROVIDES A SUITABLE ENVIRONMENT

The BREAKTHROUGH approach to housing development recognizes that shelter must be provided in a suitable living environment that reflects the needs of the residents. Bricks and mortar alone will not result in "home" or "community."

The Site and Land Planning Division of the Operation BREAKTHROUGH staff is responsible for coordinating the planning, design, and engineering to provide this suitable environment on the prototype sites. It is also responsible for assuring that the quality demonstrated in the prototype phase is also achieved at the Phase III sites using set-aside funds.

## Planning the Best Setting Possible

The goal of providing a quality environment was achieved by planning the best setting possible for the new technologies of this infant industry. Teams of notable firms in architecture, landscape, urban planning, and engineering were used for prototype site planning. Placing various housing system producers and a variety of housing types and forms on each site required skillful and talented planning. The result at each site is variety much like a village accommodating a mixture of family types and sizes. These sites will set an example of the optimum quality environments possible for both the builder and the consumer.

The basic site design theme has been clustering or planned unit development (PUD). This approach allows flexibility in site layout, while offering an opportunity for economy in providing roads, utilities, parking, and recreation areas. This approach has permitted preservation of natural features and trees and minimizes the impact of the site on the existing



The plan for the Kalamazoo Operation BREAKTHROUGH site shows clustered or planned unit development, which leaves the maximum green space while using a minimum of space for roads and parking.

environment and ecology.

Careful attention was also given to providing adequate onsite facilities such as recreation areas, community buildings, and landscaping. Providing the desired site amenities completed at the same time as the housing appears to have been a significant factor in rapid sales at those sites where units are ready.

## Carry Over to Phase III

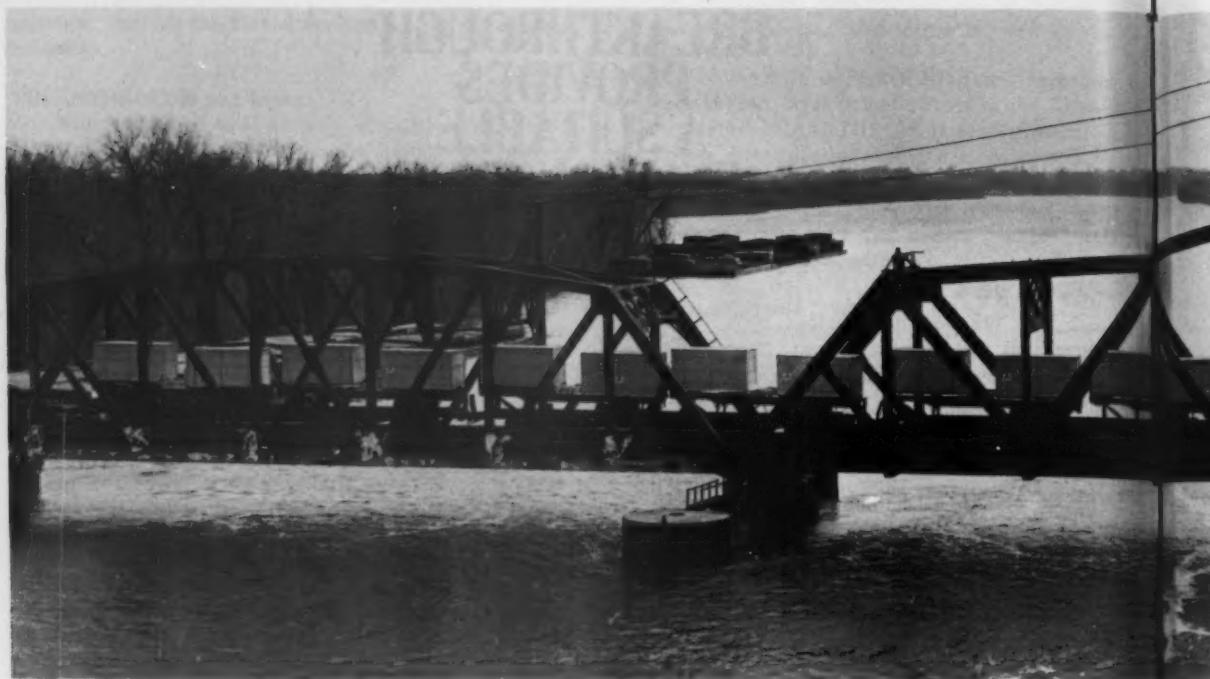
The procedures and quality

established at the prototype sites have been carried over into Phase III volume production. BREAKTHROUGH has deliberately imposed a process on the site designers.

The final site design is determined on the basis of a comprehensive examination of many related influences—site conditions, neighboring area development, community housing objectives, the housing market, and the needs of proposed occupants—not by any single influence or blind dependence on traditional solutions. BREAKTHROUGH personnel are not so easily persuaded by the developer's traditional excuse that "good design costs more."

Throughout all the prototype sites and the Phase III sites, the planners have tried to consider needs of the variety of people that will live in these communities. The toddlers are accommodated, the subteen, teenagers, and adults are provided opportunities to accommodate their needs. There are community buildings for group and community functions, swimming pools, and where facilities are not provided onsite but in the adjacent community, provision is made for easy access.

What BREAKTHROUGH has created on these sites is the potential for viable, cohesive, interesting communities that recognize the needs of future residents and link them with the surrounding neighborhood and its services. The BREAKTHROUGH program will serve as a catalyst to move the housing industry, Government, developers, and banks to a greater appreciation that good, professional site planning is essential to a suitable living environment. ☐



## BREAKTHROUGH TRANSPORTATION-A SYSTEMS APPROACH

One of the single greatest drawbacks to industrialized housing production is the problem of distribution—a problem which traditionally has tightly limited markets. The best factory built dwelling unit is of little value unless it can reach its destination intact and be economically competitive with those building products produced locally by conventional means. Transportation has been the key element in this chain.

During a series of Operation BREAKTHROUGH meetings in 1971, a clear definition of requirements and priorities acceptable to the majority of industrialized housing producers were established. Invitations to these meetings were extended to all interested industrial producers—not merely those involved in BREAKTHROUGH. A program was developed and presented to the transportation industry and the diverse Federal and State regulators. It offered a joint partnership in solving the difficult economic, regulatory, technological, and administrative hurdles that prevented factory producers from successfully

competing in distant markets.

### Removing Highway Constraints

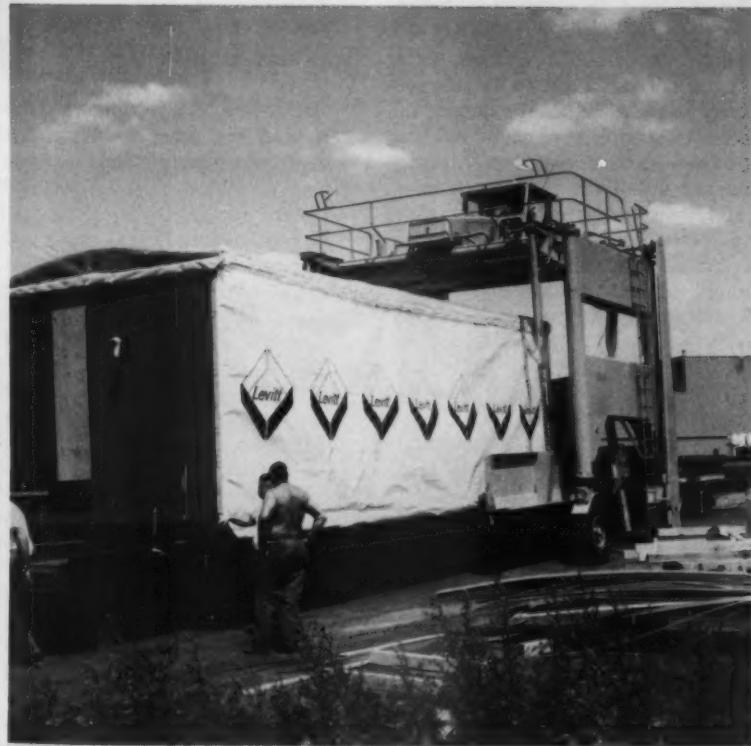
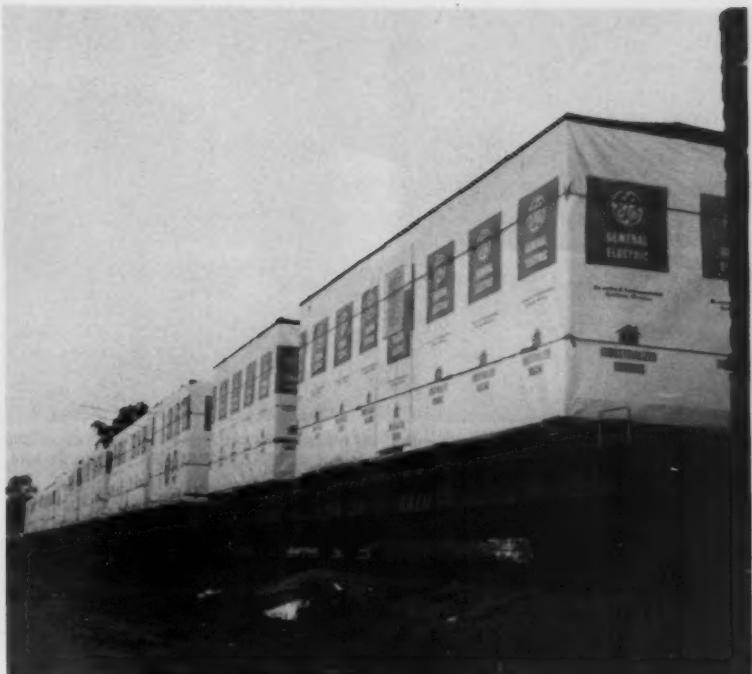
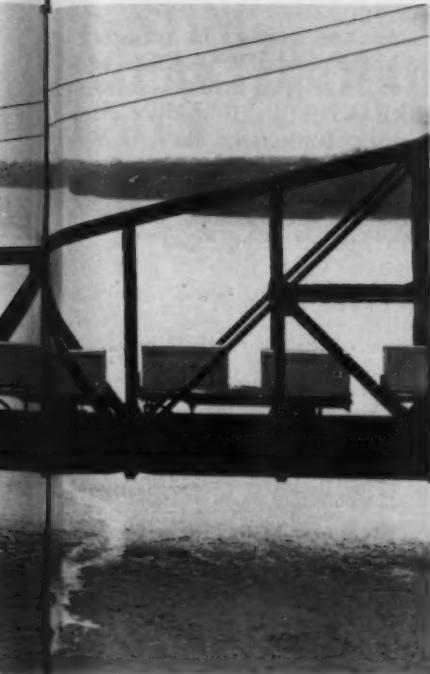
The complete cooperation of HUD, Department of Transportation, the Interstate Commerce Commission, and the modular and mobile home companies resulted in a successful roll-back of increases in highway transportation rates. This adjustment still applies, nearly a year and a half later, principally because of BREAKTHROUGH stimulation of far better communication with counterpart trucking executives plus a unified position of the modular industry.

Generally, the conditions governing the shipment of mobile homes have been superimposed on industrialized housing units. This is unfortunate since modular loads are considerably more rugged, stable in transit, and travel repetitive routes. The maze of costly State-by-State permit requirements, differing protective sign requirements, length and width limits, and escort regulations all significantly raise the total transportation cost of the dwelling units.

Two particular penalties alone add from 10 to 25 percent to the cost of each shipment. One is the requirement by each State for a special permit. The second is the general prohibition of shipping two modules on a single trailer.

In the case of the building module, one transportation problem is related to its dimensions. When mounted on a transporter, it is usually 12 feet wide, it measures from 12 to 16 feet in height, and its length ranges from 15 to 60 feet, with weights varying from 10,000 to 30,000 pounds. It is clearly an "oversize" product which mandates careful route selection over the Nation's highways and railways. The impact on the highways is very complex since each State, county, and municipality has its own regulations and edicts relating to the control of oversize loads.

Another factor is the question of control that the producer relinquishes during the transit period from factory to building site. As mentioned earlier, these often include a bewildering



**LEFT**—Biggest single shipment (84 units) of FCE-Dillon concrete core system modules crosses the Missouri River en route to Sacramento, Calif.

**RIGHT**—Experimental five-car multiple rail shipment of General Electric modules travels from the G.E. Plant in Valley Forge, Pa., to the Memphis BREAKTHROUGH site.

**BOTTOM**—Utilizing a method employed by circuses, a "Straddie Buggy" positions a Levitt module exactly on a rail-car's centerline. This precise positioning is necessary in order to meet rail clearance requirements.



Twelve-foot wide General Electric modules are loaded for shipment by trucks from the G.E. plant at Valley Forge, Pa., to the Memphis BREAKTHROUGH prototype site.

multiplicity of Federal, State, and municipal authorities as well as industry rules and standards. Often these technical and administrative controls have a definite impact on quality control, schedules, logistics, pricing, and, indirectly, the physical design of the unit itself.

HUD drafted "model state legislation" to provide uniform State regulations on shipments of mobile homes and modular housing. The model legislation was designed to eliminate width and length restrictions and to encourage State reciprocity on shipping permits. HUD is currently working with the American Association of State Highway Officials to gain acceptance of the legislation.

#### Rail Master Planning

A chief problem for all industrialized producers has been their inability to centralize their plant locations and gain manufacturing economies of scale as long as transportation limited accessibility of distant markets. Highway transportation costs generally preclude making deliveries over 250 miles range in the East and 400 miles in the West; consequently, plants proliferate.

Rail transportation offers opportunities for factory centralization. Further, full trainloads of 30 to 60 modules offer fast, economical, and safe delivery. However, the railroads, generally designed to transport at flat-car width, undertake elaborate precautions to insure a "clear-track"

for the overwidth load and prescribe rigid conditions that the shipper must meet.

BREAKTHROUGH and its producers presented to rail carriers a clear strategy to meet the economic, technological, and regulatory needs of the producers. The major points: industrialized housing now needs specialized services in terms of economic per-train-mile charges; extra length rail cars need to be inexpensively available to the producers; the need exists for a standard modular tie-down method capable of meeting shipper and carrier needs in terms of safety, protection, low-cost purchase, and installation. Much controversy occurred concerning the unconventional rail rate proposal; but the car problem and the tie-down priority were accepted for immediate joint action.

A Joint BREAKTHROUGH/Railroad Technical Group was created to solve the modular tie-down problem. The Group is composed of HUD, National Bureau of Standards, the Advisory Committee to HUD created jointly by National Academies of Science and Engineering, Forest Products Laboratory; five producers and six technical personnel from railroads. The goal is to develop a simple, standard tie-down system acceptable to the housing industry that can be certified by the Association of American Railroads. At present, there are no standards and the multiplicity of securement systems has caused the cost to soar.

Intensive negotiations were undertaken with several railroads to overcome the track clearance problems of shipping two trainloads of BREAKTHROUGH modules from Levitt's Battlecreek, Mich., factory 2,500 miles to King County, Wash. The trip became a test case for new trainload rates-\$84,000 instead of \$137,000-to bring long distance shipping within range of producers. HUD and General Services Administration represented other producers before railroad managers in rate negotiations to lower the rate an additional 20 percent. These continued efforts met with varying degrees of success.

Several types of modules have been technically examined and tested in special railroad impact and over-the-road tests. The results led to selecting three candidate tie-down systems for final testing and evaluation. Hopefully, one or more of these systems will soon be approved by the group, and recommended for standard use.

#### Other Transportation

DOT, the U.S. Corps of Engineers, and the American Waterways Association will assist HUD in developing a "waterway feasibility plan." The plan will identify present geographic, economic, technological, and institutional constraints and propose solutions which will allow realistic intra-coastal and inland water economic competition with truck and rail modes.

The above Phase II efforts have barely started the momentum towards reducing transportation costs. To reduce costs for Phase III shipments, HUD-FHA will apply BREAKTHROUGH negotiation techniques to their large programs involving Phase III producers.

While BREAKTHROUGH has made an acceptable start in solving the crisis portions of transportation problems and laying the groundwork for larger solutions, it has merely scratched the surface. The momentum needs to be continued if transportation is to enhance rather than restrain the Nation's industrialized housing program. ☐

# TESTING BREAKTHROUGH UNITS

Testing and evaluating Operation BREAKTHROUGH housing systems rely heavily on a special set of performance standards designed especially for the program. These "Guide Criteria" were developed through the cooperative efforts of HUD, the National Bureau of Standards, and the National Academies of Science and Engineering. The criteria enable BREAKTHROUGH to evaluate performance in the usual structural, electrical, and mechanical areas as well as in the areas of comfort and utility.

Much of the housing system evaluation could be performed through normal review of drawings, specifications, and calculations. However, laboratory and field testing for structural defects was found to be necessary in many cases because of the new materials or innovative methods employed by many of the BREAKTHROUGH Housing System Producers.

In addition to basic structural testing, many tests were performed to determine fire safety. Materials submitted for use as interior finishes on walls and ceilings, cabinetry and floor coverings were tested for their flame spread and smoke generation properties to see if they complied with the recommendations of the "Guide Criteria." Likewise, fire endurance tests were performed on roof/ceiling, floor/ceiling and wall components. Furnaces located at five separate testing laboratories were used in conducting these tests.

BREAKTHROUGH testing went beyond the basic life and property safety considerations to evaluate the housing system in relation to the users. Much of this work is to be performed onsite because the acoustic and atmospheric environments to be tested require an operational housing unit for thorough evaluation. Such tests can actually determine the vibrational characteristics of a floor

system in response to human stimuli.

BREAKTHROUGH's Evaluation and Testing Program has included the Naval Civil Engineering Laboratory and the Forest Products Laboratory. Ohio State University, Purdue University, and the University of California at Berkeley have assisted in the testing process as have an impressive number of private testing laboratories.

The entire testing and evaluation effort has but one primary objective; to insure that BREAKTHROUGH housing, whether innovative or conventional, will perform equal to or better than housing built under current building regulations. ☐

**At the National Bureau of Standards Testing Laboratory in Gaithersburg, Md., materials used in construction and the final modules were both tested for structural strength and fire resistance. Operation BREAKTHROUGH officials are confident that the units are at least equally as safe as conventionally built homes.**



# Breakthrough Sites



## Legend

SFA	Single family attached
SFD	Single family detached
MFLR	Multi-family low rise
MFMR	Multi-family medium rise
MFHR	Multi-family high rise

## 1 INDIANAPOLIS, IND.

42.9 acres, part of former State Mental Health Farm.

	Type	Units	
HSP	MFLR	36	
FCE Dillon	MFLR	8	
General Electric	SFA	48	
Home Building	SFD	45	
Material Systems	SFA	32	
National Homes	SFD	18	
Scionz	SFA	14	
Pantek	SFA	28	
	SFA	40	

## 4 MACON, GA.

50 acres on Chambers Rd.

	Type	Units	
HSP	MFLR	12	
Alcoa	SFA	40	
	MFLR	18	
Boise-Cascade	SFA	31	
	MFLR	80	
Building Systems	SFA	26	
	MFLR	12	
Christiansen Western	SFA	26	
Hercofarm	SFA	28	
	MFLR	12	
Boise-Cascade	SFA	28	
	MFLR	47	
Christiansen Western	SFA	28	
	MFLR	28	
Material Systems	SFA	20	
	SFD	10	
Pantek	SFA	16	
	SFA	20	

## 7 SACRAMENTO, CALIF.

31.2 acres at 57th and Broadway approximately four miles southwest of downtown Sacramento.

	Type	Units	
HSP	MFLR	24	
Alcoa	SFA	24	
	SFA	4	
Boise-Cascade	SFA	28	
	MFLR	47	
Christiansen Western	SFA	28	
	MFLR	28	
Material Systems	SFA	10	
	SFD	16	
Pantek	SFA	20	

SITE DEVELOPER: Eickling and Walker



# BREAKTHROUGH PHASE III-VOLUME PRODUCTION

Operation BREAKTHROUGH is working with 22 housing systems producers and with private firms and public agencies to facilitate the volume production and marketing of BREAKTHROUGH housing. Throughout the country, more than 25,000 housing units are being developed in Phase III of the program and represent an effective demonstration of industrialized housing produced and marketed at competitive costs.

## Removing Legislative Constraints

One of the major roadblocks to competitive production has been State and local regulations based on conventional construction. Since May 1969, Operation BREAKTHROUGH has encouraged all 50 States to enact legislation to enable industrially produced, quality housing to be constructed throughout each State under statewide, mandatory design standards. Twenty States have enacted such legislation, and many others are considering similar action.

HUD is also working with the National Conference of States on Building Codes and Standards (NCSBCS), a voluntary association of senior building and housing officials, to develop a new model "Manufactured Buildings Act." This act would supersede a HUD-developed model "Industrialized Housing Act" published in 1970 by the Council of State Governments. The new act would expand the current emphasis on factory-built housing to include all structures produced industrially. Like its predecessor, standards promulgated under the new model would supersede local standards.

State-certified and approved manufactured buildings, inspected by the State or its agents, may be constructed anywhere in the State, local codes notwithstanding. Reciprocity with other States is encouraged, as is the development and promulgation of codes and standards on multi-State bases.

## Private Enterprise Development

In addition to these efforts of

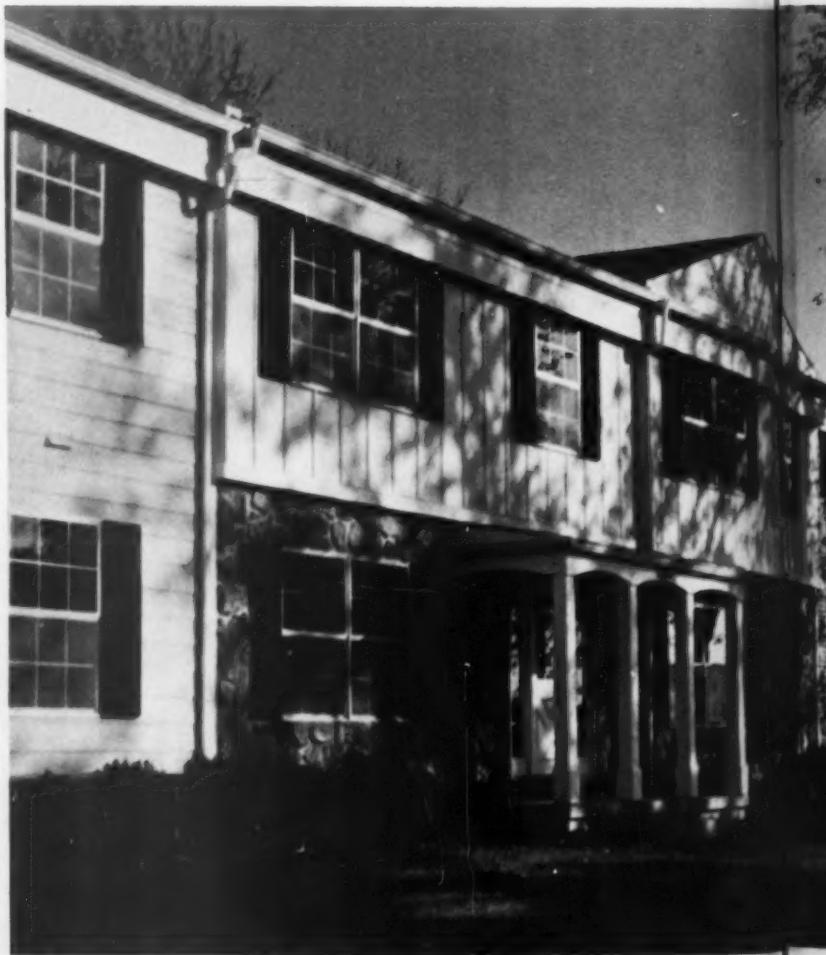
the Washington Operation BREAKTHROUGH Market Aggregation Division, the regional BREAKTHROUGH staff has been busy on a local level. Their efforts place particular emphasis upon involving responsible sponsors, developers, builders, and design firms in developing assisted housing using BREAKTHROUGH systems.

The producers and developers select housing sites and initiate conceptual planning and design activity. The conceptualized housing developments are then reviewed by HUD's local offices for full conformance with standard loan processing requirements. Those developments which meet HUD's criteria for project selec-

tion, equal opportunity, and housing management are then subjected to an additional stringent review by BREAKTHROUGH to ensure that the highest attainable standards of site planning and design are achieved.

Subsidy funds for qualified projects are then reserved, subject to feasibility and final loan processing by local HUD offices. Concurrent BREAKTHROUGH review of the projects continues through start of construction, with local offices solely responsible thereafter.

In this manner, some 25,000 subsidized housing units developed with "earmarked" funds appropriated under HUD subsidy programs are to





**LEFT**—After being selected to participate in Operation BREAKTHROUGH's Phase II on two prototype sites, Scholz Homes is now building units for Phase III developments like these Ambery Apartments in Columbus, Ohio.

**ABOVE**—Hercoform Company has completed these Phase III homes in Springfield, Mass. They are essentially the same garden apartments Hercoform developed for two Operation BREAKTHROUGH Phase II sites.



be built, using BREAKTHROUGH housing systems approved previously for construction only on prototype sites. In addition, some 7,000 units of market subsidy BREAKTHROUGH type housing are targeted for construction using funds not previously earmarked for subsidized or unsubsidized Phase III housing. Seventeen of BREAKTHROUGH's 22 producers are participating in this, the volume production and marketing phase of the program.

By June 30, 1972, it is estimated that about 150 assisted housing developments will be processed using earmarked and non-earmarked funds. Many of these developments will have

started construction, while several will be completed—and occupied.

Present plans indicate that Operation BREAKTHROUGH's producers will by then have made firm commitments to create and operate more than 35 factories to produce these housing units, with many already in production. Thus, some 5,000 jobs will be created directly, with many other persons gaining employment with firms otherwise involved in the development process.

The financial impact of Operation BREAKTHROUGH's volume production and marketing efforts is considerable. It is estimated that about \$600 million in mortgage loan financing will be required in the development of the 30,000 housing units to be produced in this phase of the program. Federal, State, and local tax revenues will benefit materially.

#### State Housing Agencies

Over the past several months, Operation BREAKTHROUGH has been negotiating to open volume housing markets in major States by involving selected State housing finance or production agencies in the development or financing of BREAKTHROUGH housing. Recently, Memorandums of Understanding were signed by BREAKTHROUGH, the Michigan State Housing Development Authority, and the Massachusetts Housing Finance Agency. These agreements provide that both earmarked and non-earmarked BREAKTHROUGH housing will be produced with State financing.

For example, BREAKTHROUGH is allocating to the Michigan Authority for its commitment to specific housing developments, 750 units of earmarked Interest Subsidy (Section 236) funds, of which 150 units also are to be subsidized with Rent Supplement funds appropriated under Section 221 (d)(3). The Authority will finance these units plus 750 housing units from its own State subsidy allocation for middle-income occupancy. All 1,500 units will be constructed utilizing BREAKTHROUGH-approved housing systems. The Massachusetts Agency is also financing 1,500 units of BREAKTHROUGH housing.

Similar negotiations are being conducted now with the New York State Urban Development Corporation, and with other major State housing organizations. In each instance, the State agency is also providing assistance to BREAKTHROUGH's housing producers in their efforts to develop new plant facilities for industrialized housing production in the State.

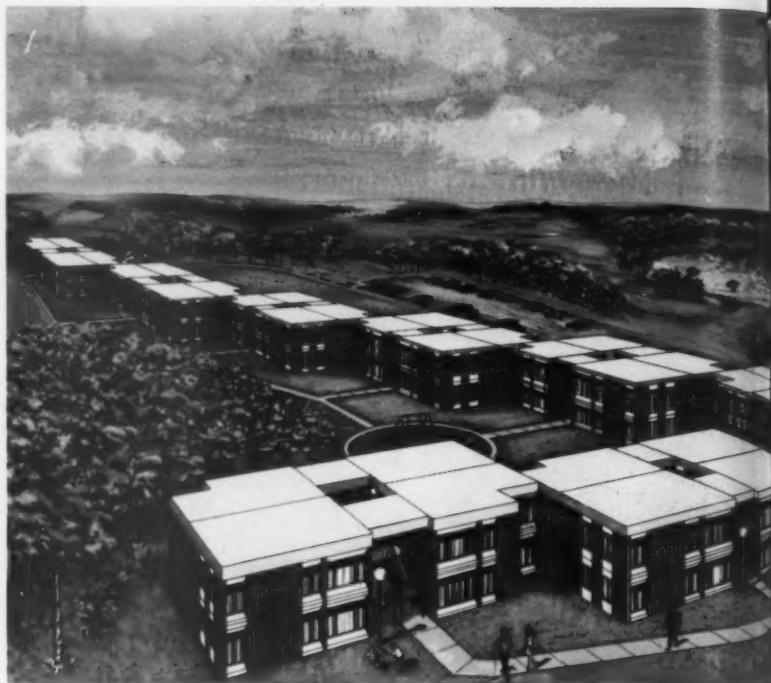
In addition, Operation BREAKTHROUGH has cooperated with State finance and housing agencies in New Jersey, West Virginia, New York, Illinois, Delaware, and Missouri in the financing or production of specific BREAKTHROUGH housing projects.

#### Market Aggregation Liaison

Regional BREAKTHROUGH staff have been coordinating these market aggregation and project development activities with many State planning agencies and with certain major metropolitan organizations. In addition to general information provided to many councils of governments (COG's) by the HUD-funded National Service to Regional Councils, agencies such as Miami Valley Commission of Dayton, Ohio, have developed housing market planning processes which now involve developing BREAKTHROUGH housing for low- and moderate-income households in selected areas of their regions.

An impressive number of State BREAKTHROUGH agencies are actively conducting market aggregation activities, in coordination with various representatives of HUD. In several instances, Comprehensive Planning funds, (Section 701(a)), have enabled necessary research to be accomplished under State auspices for the first time.

One of Operation BREAKTHROUGH's most impressive Phase III housing developments was suggested by a regional planning commission in Kansas City, Mo. Working in an innovative manner with Section 701(a) funding, the Kansas City Metropolitan Planning commission conducted a survey of regional housing market needs, concentrating upon an effort to achieve fair dispersal of low- and moderate-income families



throughout the metropolitan area. Special efforts were made to locate the new housing near potential job opportunities. The housing channeled through this process is now being developed with assistance of a local nonprofit housing organization using BREAKTHROUGH units.

Another major inter-governmental effort has resulted in the aggregation of 1,300 public housing units for housing authorities in North Central New Mexico. Of these, 600 units are funded by Operation BREAKTHROUGH from earmarked annual contributions contract monies. This effort represents true pooling of a housing market for an industrialized producer within a regional area. Such housing is to be constructed on scattered sites in some 35 communities. It is probable that local people will be involved in a new plant especially constructed to supply these BREAKTHROUGH homes. Efforts to embody housing systems designs traditional to the region have been encouraged. Invitations for proposals for all 1,300 units have been extended to developers who agree to work with BREAKTHROUGH producers in creating developments under Turnkey I and II. Discussions

Artist's concept shows General Electric Belmont Garden Apartments erected under Phase III as part of Brook Village North in Nashua, N.H. Urban Systems Programs Department of GE's Re-entry and Environmental Systems Division first developed the housing for Operation BREAKTHROUGH's Phase III.

are currently underway to determine the feasibility of offering the home-ownership provisions of Turnkey III to some occupants.

#### The Pattern of Success

The result of these many efforts is that both the public and private sectors are now creatively involved in the volume production and marketing of industrialized housing. Strengthening this partnership is the continuing task of Operation BREAKTHROUGH. The end goal is, of course, the production and marketing of high quality, volume-produced housing throughout the country. These efforts are proving successful. ☺

# BREAKTHROUGH

## "Type B" Contracts

Much has been said and written about Operation BREAKTHROUGH, but has anyone heard of the contracts known as Type B's? Over \$1 million in contracts were awarded for these "other BREAKTHROUGHS." Type A's were the housing systems now being completed on nine sites. Type B contracts were let for further study of housing subsystems—including software—and for those total building systems needing considerable design development before they would be ready for the market.

The eight Type B contracts and two related contracts let as a result of BREAKTHROUGH include an interesting variety of research. For example American Standard of New Brunswick, N.J., is currently investigating innovative plumbing systems to determine the suitability of new waste plumbing systems for use in the United States and the possible economies which might result.

International Technology, Inc. of Baltimore, Md., was awarded a contract calling for the study of a new electrical power distribution system. The new system has substantially increased the number of sources for tapping power.

SMS Partnership of Stamford, Conn., conducted a study of prefabricated modular service and utility cores to determine the potential of factory-built flexible core systems for homes. A utility core and panel partition system was developed through the study.

Dow Chemical Company of Midland, Mich., was required to develop and test binder-aggregate modules. A formula for a lightweight, castable material which met both technical and cost feasibility tests was developed.

George Washington University of Washington, D.C., studied and

reported on the feasibility of a land-lease/chattel system. State-chartered local authorities could acquire possession of land and then lease it to individuals to build their homes. Homeowners could register their lease through Title Registration Corporations and at the end of the 50 year life span of the house, control could revert to the authority. Such a system could reduce the cost of homeownership by about 25 percent based on the average cost of land in the total homeownership transactions under the current real estate system.



Workmen at the OVE research house in Maryland install the prefabricated plumbing wall containing plastic pipe. The NAHB Research Foundation designed the cost-saving techniques used in the house.

BSDI-Urban Design and Development Corporation of San Francisco, Calif., is working with an Illinois State agency to identify and organize housing systems developers interested in buying industrialized housing. The feasibility of building a steady, volume housing market is the important element of this study.

Restrictive land use regulations were studied by Ross, Hardis, Babcock, McDugal and Parsons of Chicago, Ill. The report suggested practices which could be adopted by State and local governments to relax unnecessary land use restrictions.

### Innovative Engineering

Among the most interesting of these contracts is the Type B contract closely related to the Type A BREAKTHROUGH project. It involved a total system of construction developed by the National Association of Home Builders Research (NAHB) Foundation in Rockville, Md.

The idea, as conceived by the NAHB research staff, was to take the conventional "stick-built" house, as built by hundreds of home builders across the country, and engineer a coordinated product. The "stick-built" house framed at the site has been built essentially the same way for decades; incorporation of roof trusses and plywood sheathing are the only major, widespread structural changes observed in the last 20 years.

Adopting a simple 24-inch model for the design of the whole house proved that it could be constructed with little change in the construction process so well known to the trades. The analysis showed that aligning all structural members on the two-foot model would allow reducing the number of pieces used and the sizes of the members themselves. With a little

glue, fewer nails, and good engineering sense, the design began to shape up—with some amazing savings in lumber. Tests proved that the strengths remained more than adequate with no reduction at all in safety factors.

Engineering design changes involving material size reductions were weighed against the problems of introducing new practices to the trades and the costs of new materials such as adhesives—not traditional items of construction. The process became known as "Optimum Value Engineering" (OVE). Each design innovation was carefully plotted against costs, codes, trade practices, predicted installation time, market acceptance, and the quality achieved.

Because of the reduction in size and number of pieces used, the structure is much lighter, thus requiring a lighter footing and foundation system. Only three yards of concrete in the footings were necessary to carry the lighter load—or about one-third of the concrete used for a conventional house of the same size. Many other items of labor and material savings were incorporated. Some of these items had been used by builders for years but had never been brought together in a total structural system.

#### OVE Research House

The real test of the optimum value theory came with construction of a research house. Maryland builder David C. Smith built the prototype OVE house on a lot in his Rockville subdivision. After placing the foundation, a crew of five men framed the shell in a regular stick-built manner in one day. Sub-contractors were then called in by the builder to finish the job.

Many innovations were used in

the design of the interior of the house. Interior partitions were of the same construction as exterior walls—2 x 3's with all openings single-framed.

The fiberglass bath tub unit was elevated about three inches on a wood base to permit above floor rough-in of the plumbing. A prefabricated plumbing wall including all the piping was installed. Plastic pipe was used throughout for hot and cold water lines as well as for drain, waste, and vent.

A complete wiring harness was prefabricated and the panel was mounted on a plywood base with all circuits pre-wired and tied into the panel. The plywood panel was then simply nailed in place. This device has successfully passed all underwriters' tests and will soon be marketed.

The electric heating was handled very simply with a warm air trunk line extending from the furnace overhead down the hall with a stub extending out to each room.

Other items such as metal drywall clips were used whenever possible instead of the usual more costly wood blocking. A small rectangular moulding was adopted as a universal interior trim. The shape permitted a simple fit at all inside corners.

In appearance, both interior and exterior, the changes in materials are not obvious. The house is similar to any other well constructed suburban home. The materials are all common to conventional houses, but applied in different ways. Tests indicate that the house should be as strong, weather resistant, and durable as a comparable conventionally built house.

The only caution that may have to be applied is that the system requires exact adherence to framing

layouts. The methods are close enough to ordinary practice, that some may try to apply them without adequate training of workmen.

#### Cost Comparison

Costs of a 952-sq. ft. OVE prototype house, when compared with a typical one-story house similar in plan, shape and size, showed a reduction of \$1,652. Reduction in labor represented \$506 of this figure, and savings in materials amounted to \$1,146. All basic materials are conventional and the type of labor required is available everywhere. There is nothing revolutionary about the construction. The cost savings resulted from the dozens of innovations incorporated in the design. Many of the cost-saving techniques that make up the total system can be used for either site-built or factory-produced housing. And the best part of it all is that the system is available for immediate use by builders all over the country.

In addition to these eight contracts, two BREAKTHROUGH-related contracts were awarded. Forest City Enterprises of Cleveland, Ohio, has pilot tested a proposal that would let homebuyers use their vested interests in pension funds as collateral for downpayments in the purchase of a home. The results of the study are not as yet complete.

Under a similar contract, the Washington (D.C.) Center for Metropolitan Studies examined the design, production, and marketing of built-in furniture systems suitable for low-income families. This furniture would be priced as low as modern materials, manufacturing and distributing techniques would allow. The published report "Focus on Furniture" is available from the Government Printing Office. ☐

# FIRST BREAKTHROUGH HOMES OCCUPIED

HUD Secretary George Romney welcomed the first families to move into BREAKTHROUGH housing units on the Kalamazoo, Mich., site in March 1972. The Secretary noted that the families were marking "the beginning of a promising future for volume-produced housing in this country."

The Kalamazoo site, named New Horizon Village, features a wide assortment of housing, including townhouses, garden apartments, medium-rise and low-rise apartments, and single-family homes. All the homes are being marketed as a cooperative under the Interest Subsidy program (Section 236). The community site plan features a community building, an 1800-square foot outdoor swimming pool, baseball diamond, children's play area, and green spaces. A large city park and natural lake adjoin the site.

Albert L. White, a construction superintendent with a local firm, his wife, Jonnie, and their four children, aged 12 to 16, moved into a five-bedroom Levitt townhouse. They had previously lived in an apartment and wanted a home with a basement.

Other new occupants included William E. Livingston, an assistant professor at Western Michigan University. Mr. Livingston, his wife, Patricia, and their nine-year old son moved into a two-bedroom Levitt townhouse.

James L. Dehem, an undergraduate assistant in the Psychology Department of Western Michigan University, moved into a one-bedroom Hercoform apartment. Mrs. Cheryl Armstrong, a waitress with two children, moved into a three-bedroom Levitt townhouse. Mrs. Rhea Simms, a quality inspector, and her one child moved into a two-bedroom Inland-Scholz townhouse.



Larry D. Hill, a route driver for a local company, and his wife, Jean, moved into an Inland-Scholz two-bedroom townhouse from a one-bedroom apartment. Expecting their first child shortly, the Hills voiced appreciation for the roominess of their new home.

Prior to the formal welcoming ceremony scheduled for mid-morning at the Community Center, Secretary Romney managed to drop in on Mr. and Mrs. Hill in their new townhouse. During their impromptu chat, the Secretary asked Mrs. Hill if she had encountered any problems in her new home. She replied that everything was "just fine... so far." ☐

TOP—Before the welcoming ceremony at the Kalamazoo BREAKTHROUGH site, HUD Secretary George Romney toured the homes.

LEFT—Mr. and Mrs. Albert L. White make the final inspection of their five-bedroom Levitt townhouse.

RIGHT—Mr. and Mrs. Larry D. Hill moved into a two-bedroom Scholz townhouse from an apartment so they would have a bedroom for their first child.

# Using Modules: College Housing



College housing—like today's college student—is in a constant state of flux. Student bodies expand and shrink from year to year; often the demand for housing is immediate and cannot be planned out neatly in advance.

To satisfy this problem, factory-built modular units are being utilized more and more on college campuses. These units provide quick, low-cost construction, immediate occupancy, and pleasing designs that suit financial limitations and student tastes.

#### HUD Assistance

Azusa Pacific College at Azusa and Glendora, Calif., built such housing with HUD assistance. A four-year Christian college of liberal arts and the Bible, it is California's first HUD-financed college housing community utilizing factory-built modular units. And it is also the only detached duplex project of the 10 to 20 modular college facilities assisted by HUD.

The project consists of 66 mod-

ular duplex apartments designed to house married students. The 667 square feet of living space in each apartment is divided into one-bedroom with den or two-bedroom units, each with a kitchen, breakfast area, living room, and bath. Student rentals for the apartments start at \$130 unfurnished, up to \$150 for a furnished unit.

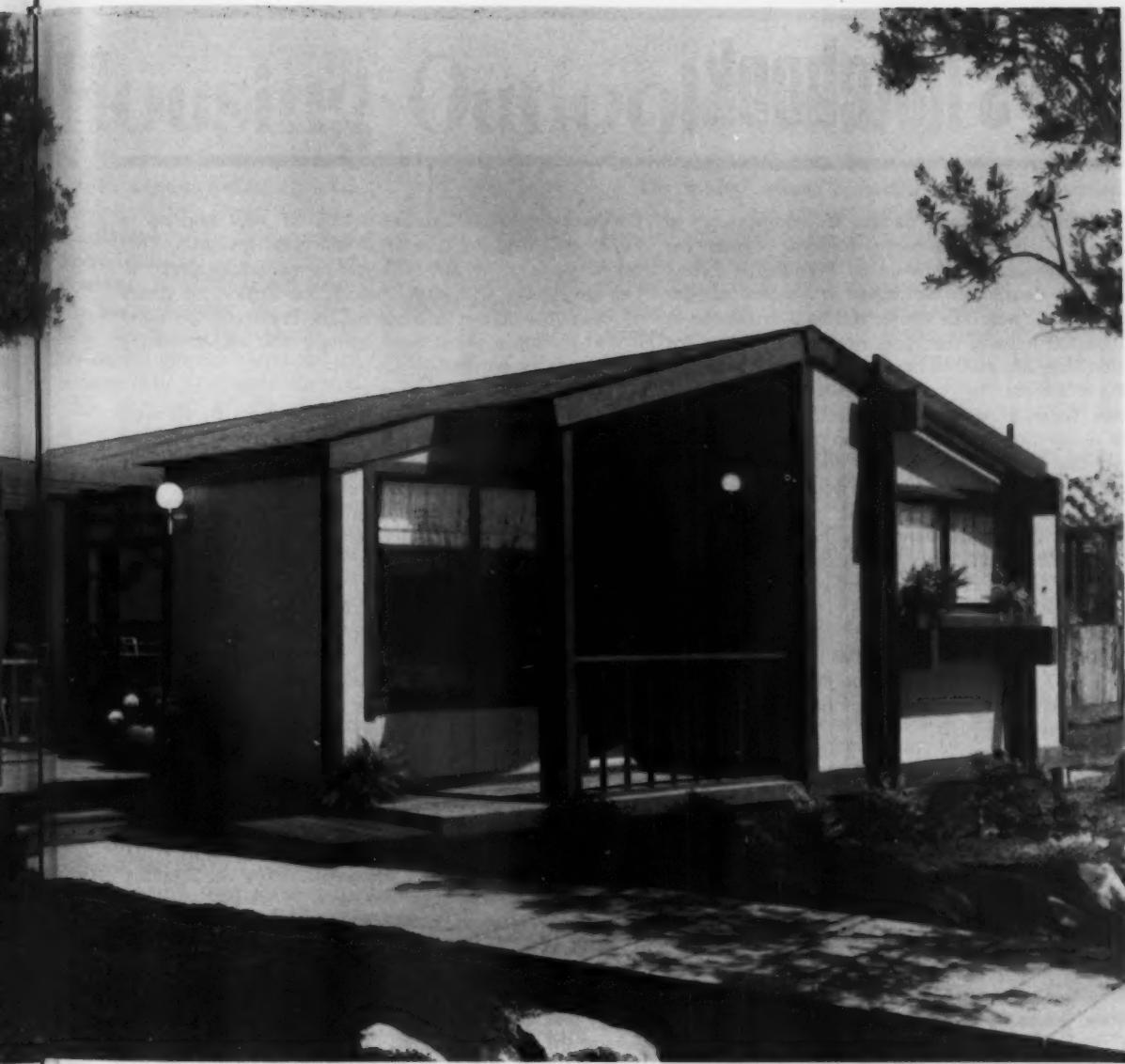
The California-style mobile-modules were designed by B.A. Beckus Associates and produced by Levitt Mobile Systems, Inc., at their factory in Fountain Valley, Calif. All apartments have high-beamed cathe-

dral ceilings, wood paneling, sliding glass doors, entry porch of redwood, carpeting, drapes, and utilities, including air conditioning. The total cost to the college of these modular units was \$451,875.

#### Solution to Housing Problems

"Azusa Pacific College is extremely pleased to offer our married students housing of this quality at such a reasonable rent," Dr. Cornelius Haggard, president of the college said. "We think it's a practical, efficient, and attractive way of solving the campus housing problems."





He added that mobile-modules are well suited to college housing needs because they can be built economically, installed quickly, and moved or added as the number of single and married students changes from year to year and as veterans return to school. The college presently has almost 800 undergraduate and 200 graduate students.

Construction on the units was completed within a 60-day period between July and September 1971. The project was fully rented by December. The 6.5-acre site adjacent to the Azusa campus has a potential

capacity of 34 more units, which will be added when funds become available.

#### College Housing Program

HUD has provided a \$600,000 direct loan at three percent interest through the College Housing Program towards the \$670,000 total cost of this project. The college is financing the difference. In the past 20 years HUD's College Housing Program has made available \$4 billion in funds through loans and subsidies.

Commenting on the project, Richard Ulf, Chief of HUD's College

Housing Branch, said, "The modular type of student housing is being used more frequently as a solution to the fluctuating housing needs of colleges. The units are part of a definite and welcome trend away from the traditional dormitory type college accommodations and away from high-rise construction. HUD encourages such innovative design and construction techniques not only to hold down cost, but also to make the housing more livable. The project at Azusa was done quickly and efficiently, which also makes good security on a HUD loan." ☺

# editor's notebook

In April Secretary Romney named 15 incorporators to organize a private, not-for-profit National Center for Housing Management. Established by Presidential Executive Order, the Center will be located in the metropolitan Washington, D.C., area. The Center will be instrumental in training 60,000 housing managers needed to operate the five million federally assisted housing units to be occupied by 1980. It will be the focus for building a well based, nationwide housing management industry that provides adequate recognition and compensation of its professional personnel. The Center "will develop and direct a totally new profession, offering employment and career opportunities to thousands of Americans," said Secretary Romney. "The Center will serve as a national focus for increasing the availability of skilled housing management manpower and for upgrading and improving the housing management field."

**Fund approvals in the Model Cities program, which started in 1967, total \$1,275 million through February 1972. In 147 cities, various stages of five-year programs have been approved by HUD.**

HUD has launched an effort to promote involvement of the arts and local artists in HUD programs throughout the country. The first step will be a National Community Art Competition, which is part of an overall Federal Government drive to promote greater involvement of local artists in federally aided programs, thereby assisting the artists and enhancing the projects.

HUD made a record matching grant of \$1,088,250 to the University of Virginia at Charlottesville to aid in restoring the Rotunda, the keystone building of the University. The Rotunda, designed by Thomas Jefferson, is considered one of the finest examples of 19th century architecture in America. The grant was made under HUD's Historic Preservation program. The Rotunda was declared a National historic landmark in 1966.

Borrowers who pay off their FHA-insured mortgages before the first ten years of the mortgage term, are no longer subject to a charge by HUD for the pre-payment. "The new regulation," said Secretary Romney, "is concrete evidence of HUD's determination to do everything it can to serve the consumer. Making prepayment of the mortgage loan more attractive is one of those ways." The amended regulation was effective May 1, 1972.

**Condominiums will represent 13% of new housing in 1972, according to Diversified Mortgage Investors. That would mean some 300,000 new condominium units. In Chicago, Miami, Denver, Baltimore, and Boston, they may go over 20% of the total starts. The condominium trend is also getting a boost from owners who are converting their rental properties.**

**Tax revenue produced for local governments by an average taxable acre in urban renewal areas throughout the country is running 395% higher than the comparable revenue produced in these areas before renewal. This increase is one of the findings of a special study made by HUD in response to a request for comprehensive national data on renewal operations.**

**A recently published survey of ten planned communities** published by the Institute for Social Research at the University of Michigan, found that there is a striking relationship between density and knowing neighbors by name. Particularly in the more crowded neighborhoods, the closer one lives to neighbors, the fewer are known by name. It may be that anonymity of residents in denser neighborhoods is used to satisfy a need for privacy not provided by the environment.

**Older Americans are the recipients of one-third of HUD housing rehabilitation loans and grants, under the Sections 312 and 115 rehabilitation programs. Persons 62 years of age or older received 32.9% of the funds and accounted for 44.1% of all persons benefitted by the programs.**

**HUD in cooperation with Temple University, Shaw University, and the Urban League Foundation, is seeking to upgrade the employment skills of low-rent housing residents for career jobs in public and nonprofit housing.** Curricula developed under Title VIII contracts are now available to local housing authorities conducting training programs. LHA staffs are currently participating in a series of workshops on planning and conducting local programs.

**The Tulsa Field Office and the Home Builders Association of Greater Tulsa have developed a home buyer counseling film for Section 235 purchasers.** The film is shown twice a month at the Home Builder headquarters and all Section 235 buyers are required to attend prior to the mortgage closing.

# Housing Outlook

By Dr. Michael Sumichrast  
NAHB Chief Economist

*Dr. Sumichrast is currently the chief economist for the National Association of Home Builders, contributing editor to *Journal of Home Building*, and editor of *Economic News Notes and Housing Starts Bulletin*. He is regularly contacted for analysis of economic trends, especially in construction, by Federal Reserve staff, the staff of the Federal Home Loan Bank Board, FNMA, Treasury, various trade associations, major corporations and lending intermediaries. He is frequently quoted in major newspapers and periodicals. With others he has authored two books on builders and several articles.*



The National Association of Home Builders (NAHB) estimates that total U.S. housing starts will increase slightly in 1972 to 2.1 million units from 2.08 million units in 1971. We should see at least as many starts as in 1971, perhaps even more. Although the numerical increase may be small, the composition of units to be produced will change significantly.

In single-family units, detached homes will continue to decrease from a 78.8 percent share of the market in 1971 to 72.4 percent in 1972. Correspondingly, townhouses and condominiums will increase their share of the for-sale market from 21.3 percent in 1971 to 27.6 percent in 1972. Townhouses and condominiums will almost double their share of total starts, increasing from 15.8 percent in 1971 to 27.3 percent in 1972.

The median sale price of housing is expected to increase by 13 percent in 1972 to \$26,200, as compared with 1971's median sale price of \$23,200. The most significant rise will be in detached houses, going from \$23,400 to \$28,900, and condominiums, \$23,400 to \$27,700. On the other hand, the median sale price of townhouses is projected to drop to \$22,600 from \$22,900.

## Builders' Views

The NAHB builders surveyed see their local economic situations as more favorable than at any other time over the last three years. General homebuilding conditions are termed good or excellent by 70 percent of the builders as compared to 54 percent last summer. Seven out of 10 anticipate a positive up-turn in single-family housing over the next three to six months, about half see positive growth in apartment construction within six months.

Inventories are at their lowest point since 1968, indicating that sales of homes are very strong. Significantly, the percentage of homes projected to be built for under \$25,000 decreased to 50 percent from 59 percent.

## The Outlook for the Economy

The builders' bullish economic outlook for their own areas is, to a large degree, supported by forecasts of a generally good performance by the economy in 1972.

This year's Gross National Product (GNP) is projected to increase from \$1,046.8 billion to about \$1,144 billion, a gain of about 5.5 percent as compared to only 2.7 percent last year. Inflation, as measured by the GNP deflator, should drop from 4.6 percent in 1971 to 3.6 percent in 1972, and the deflator should continue its steady quarterly decline to less than three percent at the end of this year.

Residential construction will increase about \$5 billion over last year. Still this will be only about one-half of the increase registered last year, when housing reached new record levels. This spur in domestic investment—\$21 billion in 1972 as compared to \$15.5 billion last year—will come this year more in nonresidential investment, which is expected to increase by \$12 billion over last year. Inventory accumulation should also show substantial strength as merchants' and manufacturers' inventories reach higher levels.

One of the most startling aspects of last year's economy was consumer willingness to save rather than spend, a disposition carried into 1972. Although the consumer will spend more this year, as disposable income increases the savings rate is expected to remain at about eight percent, an extremely high rate.

## The Outlook for Mortgage Money

With the savings rate expected to remain high, housing will not suffer from lack of funds. Last year savings and loan associations had a net inflow of \$28.251 billion, substantially over the \$11.226 billion in previous years. Net inflow for mutual savings banks was \$9.676 billion in 1971 as compared to \$4.605 billion in 1970.

Similarly, commercial banks showed a strong increase in savings from \$34.787 billion in 1970 to \$40.020 billion last year.

This year S&L's will see only a slight decline from last year's levels. Jointly banks and S&L's are estimated to get \$34 billion in net inflow of savings. To this amount one must add loan repayments of about \$22 billion at S&L's and mutual savings banks. Thus they will end up having about \$56 billion available for mortgages. Both institutions hold 56 percent of all residential mortgage debt outstanding.

Total requirement for mortgages at these two types of institutions for 1972 shows a need for about \$47 billion in 1972. Of this S&L's will provide \$37.7 billion, \$33.5 for one- to four-family units and \$4.2 billion for multifamily units. Mutual savings banks will contribute \$8.4 billion, \$6.5 billion for singles and \$1.9 billion for multiples.

## Outlook for Interest Rates

In the past six months (Sept.-March), despite the continuing tremendous flow of savings and the building pressure on rates, the conventional interest rate has declined by 23 basis points from 7.83 percent to 7.60 percent. At the same time, the FHA-VA interest rate continues pegged at seven percent; but any change poses a perplexing problem for HUD and the Administration.

Should the Administration drop the FHA-VA interest rate now, it would lessen the budgetary impact in its support of subsidized programs and spur more activity in its regular home insurance programs. However, one must keep in mind that a diminishing of the FHA rate would increase the overall budgetary impact because of the cost of the Tandem Plan in making up a larger difference between the interest subsidy payments and the market rate. There is also some question concerning the ability of the construction industry to sustain a higher rate of starts than the 1971 record.

However, the Administration is nagged by the possibility that it might have to increase the rate before or about election time should the economy take off as anticipated. That, it would not want to do. The basic question is, should the government lean against the interest rate, intervene in the market, and force the rates down? Some of the reasons why they should become clear from the examination of the way the interest rate situation shaped up at the beginning of April:

- Savings inflow into S&L's and mutual savings banks set a three-month (January-March) record. Total savings in the first three months was projected at \$10.4 billion. This is 14 percent above the three-month record of January-March 1971, \$9.1 billion.

In the mortgage markets, thrift institutions will be hard pressed to get the record flows of savings out and put to work. They may have to look more aggressively into other types of investment in addition to mortgage lending. However, as primarily mortgage-lending institutions, they are limited by law, regulations, and customs to invest in mortgages.

- Short term rates (three-month government yields) in the first three and a half months of 1972 continued to fluctuate erratically but they generally were at the same levels as the early part of the year. They were substantially lower than yields registered in mid-July of last year. At one time in February the three-month yields got below three percent, dropping to 2.99 percent, the lowest in several years. They have increased since then to 3.78 on March 23.

- Short term rates are very low compared to intermediate or long term yields. A scarcity of bills on the market has resulted from increased liquidities and the pressure of corporations and individuals to invest short rather than commit in the long term market. As a result, an unusually large gap exists between long term and short term yields.

- The intermediate and long term yields are now about 2.5 percentage points higher than short term. In July 1971 the gap was only about 0.5 percentage points

NET ACQUISITIONS OF LONG TERM MORTGAGE LOANS ON  
HOUSING PROPERTIES BY IDENTIFIABLE LENDER GROUPS  
(In Billions of Dollars)

	1969	1970	1971	1972	
<b>A. 1 to 4 Family Homes:</b>					
Savings and Loan Associations	\$16.6	\$17.1	\$31.5	\$33.5	A 1
Mutual Savings Banks	3.7	3.0	5.4	6.5	S 1
Commercial Banks	9.1	7.3	11.2	11.0	C 1
Life Insurance Companies	0.6	0.5	0.5	0.5	L 1
Noninsured Pension Funds	(1)	(1)	-0.3	-0.5	N 1
State and Local Retirement Funds	0.3	0.5	0.3	0.2	S 1
Federal Credit Agencies	4.9	5.1	3.4	3.2	F 1
State and Local Government Credit Programs	0.2	0.2	0.5	0.6	S 1
Mortgage Companies	1.6	0.3	0.9	1.0	M 1
GNMA-backed Pools		1.7	4.1*	3.9	G 1
Fraternal Benefit Societies	0.1	(1)	0.1	0.1	F 1
State Chartered Credit Unions	0.2	0.1	0.2	0.3	S 1
<b>Subtotal</b>	<b>\$37.3</b>	<b>\$35.9</b>	<b>\$57.8</b>	<b>\$60.3</b>	B 1
<b>B. Multifamily Properties:</b>					
Savings and Loan Associations	\$1.8	2.1	3.8	4.2	
Mutual Savings Banks	0.9	0.9	1.7	1.9	
Commercial Banks	0.3	0.5	0.7	1.3	
Life Insurance Companies	2.3	2.5	2.0	1.5	
Noninsured Pension Funds	0.1	0.1	-0.3	(1)	
State and Local Retirement Funds	0.1	0.5	0.2	0.2	
Federal Credit Agencies	0.9	1.1	1.5	1.9	
Mortgage Investment Trusts	0.1	0.2	0.2	0.3	
GNMA-backed Pools		(1)	0.1	0.2	
<b>Subtotal</b>	<b>\$6.5</b>	<b>\$8.0</b>	<b>\$10.9</b>	<b>\$11.5</b>	

(1) Under \$50,000,000.

\* Including Farmers Home Administration loans.

Source: HUD Gross Flow of Funds;  
Estimates by NAHB Economics Dept.

ORIGINATIONS OF LONG TERM MORTGAGE LOANS ON NEW HOUSING PROPERTIES BY IDENTIFIABLE LENDER GROUPS					
1972	(In Billions of Dollars)				
	1969	1970	1971	1972	
<b>A. 1 to 4 Family Homes:</b>					
\$33.5	Savings and Loan Associations	\$ 6.0	\$ 5.9	\$11.4	\$13.1
6.5	Mutual Savings Banks	0.8	0.6	0.6	11.0
11.0	Commercial Banks	3.4	2.5	3.3	3.0
0.5	Life Insurance Companies	0.2	0.2	0.2	0.3
-0.5	Noninsured Pension Funds	(1)	(1)	(1)	(1)
0.2	State and Local Retirement Funds	(1)	(1)	(1)	(1)
3.2	Federal Credit Agencies	0.4	0.6	0.8	0.5
0.6	State and Local Government Credit Programs	0.2	0.2	0.5	0.8
1.0	Mortgage Companies	2.1	2.9	1.1	4.5
3.9	State Chartered Credit Unions	0.2	0.1	0.2	0.2
0.1	<b>Subtotal</b>	<b>\$12.3</b>	<b>\$13.1</b>	<b>\$21.1</b>	<b>\$24.0</b>
0.3					
\$60.3	<b>B. Multifamily Residential Properties:</b>				
4.2	Savings and Loan Associations	\$1.0	\$1.2	\$1.6	\$ 2.3
4.2	Mutual Savings Banks	0.4	0.4	0.6	11.0
1.9	Commercial Banks	0.2	0.3	0.4	0.7
1.3	Life Insurance Companies	1.8	2.0	1.5	1.7
1.5	Noninsured Pension Funds	0.1	0.1	(1)	0.1
(1)	State and Local Retirement Funds	0.1	0.1	0.1	0.1
0.2	Federal Credit Agencies	0.9	1.0	1.3	1.4
1.9	State and Local Government Credit Programs	0.2	0.5	1.0	1.1
0.3	Mortgage Companies	0.2	0.7	0.8	1.0
0.2	Mortgage Investment Trusts	0.1	0.1	0.4	0.2
\$11.5	<b>Subtotal</b>	<b>\$5.0</b>	<b>\$6.4</b>	<b>\$7.4</b>	<b>\$ 9.6</b>

(1) Under \$50,000,000.

Source: HUD Gross Flow of Funds;  
Estimates by NAHB Economics Dept.

between short term and intermediate and just under two percentage points between short and long term rates.

• Long term rates, despite the gap, are down from historical highs of two years ago. They are also down substantially from the seven percent levels of last July to 5.68 percent at the end of March. This substantial downward shift is not yet reflected in mortgage rates. The decline in mortgage rates since last July has been only six basis points, nowhere near the 140 basis point drop, for instance in 10-year government bond yields.

Most financial analysts expect the short term rate to rise, but it does not mean that long term rates should or will stay at the current levels. As a matter of fact, to a large degree the stubbornness of long term rates results from uncertainties investors have in assessing what the degree of inflation will be as the year progresses.

#### The Secondary Market

This need for Government intervention results in subsequent fear of a march toward federalization of the mortgage market. But certainly, not too many people want the Federal Government to take over the mortgage markets, or for that matter any activity which could be done more efficiently without Government intervention. The fears are therefore unfounded.

First, GNMA is limited to a \$2 billion ceiling for which it can pledge commitments on mortgages, and thus, does not have an unlimited tap on the Treasury. Second, since starting operations in September 1971, GNMA commitments amounted to \$2.537 billion, but payback of commitments came to \$1.681 billion. Thus, the net result was commitments of \$856 million through February 1972. Third, the net cost to the Government in supporting this level of commitments was remarkably minimal; in fact, the total net cost was less than \$19 million. This was because some portion of the GNMA Tandem Plan produced a net cost while other portions showed a net gain.

This \$19 million cost to the Federal Government must be considered in relation to the benefits provided in helping to reduce yields on mortgages. While the degree of influence the Tandem Plan had in reducing interest rates cannot be determined precisely, there is little question that it did influence the overall decline in rates. When the program was initiated, rates still were increasing. But in mid-1972, rates started to drop. For instance, the average FNMA prices of three to four month auction improved by \$3.55 and corresponding yields dropped more than 50 basis points.

The question of federalization of mortgage market vis-a-vis the temporary help provided by the GNMA Tandem Plan also should be put into a proper perspective. This Plan was activated because interest rates were increasing during the summer of 1971 even though record savings were available. This makes little economic sense; where a surplus of money exists and consumers are not borrowing, rates should go down—not up. Secretary Romney instituted the Tandem Plan to hold the FHA rate at seven percent. As a result, within a very short time the need for support vanished as interest rates dropped. The fact is

### Major Money Flows and Loan Closings by Associations

(Millions of Dollars)

Period	Major Sources of Funds				Mortgage Loans Closed	Excess or Deficiency of Funds
	Net Savings Receipts	Mortgage Loan Repayments	Net Income After Interest	Total		
1955	\$ 4,891	\$ 5,969	\$ 370	\$11,230	\$11,255	\$— 25
1956	5,006	6,016	393	11,415	10,325	+ 1,090
1957	4,765	5,886	413	11,064	10,160	+ 904
1958	6,063	6,604	482	13,149	12,182	+ 967
1959	6,604	7,637	548	14,789	15,151	— 362
1960	7,559	7,375	590	15,524	14,304	+ 1,220
1961	8,743	8,969	725	18,437	17,733	+ 704
1962	9,351	11,217	812	21,380	21,153	+ 227
1963	11,072	12,999	689	24,760	25,173	— 413
1964	10,590	14,515	690	25,795	24,913	+ 882
1965	8,513	15,206	805	24,524	24,192	+ 332
1966	3,615	13,134	602	17,351	16,924	+ 427
1967	10,649	13,875	450	24,974	20,122	+ 4,852
1968	7,478	14,309	769	22,556	21,983	+ 673
1969	4,079	14,144	924	19,147	21,847	— 2,700
1970	11,018	13,851	773	25,642	21,387	+ 4,255
1971	28,250	20,788	1,150e	50,188	39,485	+ 10,703
1972e	24,000	16,000	900e	40,900	36,500	+ 4,400

e - Estimate

that the GNMA Tandem Plan is now non-operative, since prices generally are higher than those set last year at 95 and 96.

#### Supply of Housing

Every time housing starts get to a higher level the question of overbuilding comes up. In 1966 the system of independent contractors built less than 1.2 million units. In 1967 only 1.32 million; in the following three years it averaged only 1.5 million starts per year. Yet the net effective demand was close to two million units per year. For the first time in history the industry started two million units last year, or just about what is needed, and already some people are talking about serious overbuilding.

The available facts at this time do not support this. For one thing the pace of housing starts will slow down. The seasonally adjusted annual rate is expected to drop this year from its record levels. A 2.5 million rate is too high to be continued for more than several quarters, but available evidence does not even suggest that the bottom is going to drop out of the housing market.

Both rental and homeowner vacancy rates are at one

of the lowest levels since the Bureau of Census started to collect the data (1955). The slight upward movement in rental vacancy rate—5.3 percent in 1972, up from 4.8 percent a year ago—is obviously a result of record-building activity. One should worry about overbuilding if the rate should get to 7.5 percent to eight percent levels.

The experience shows that the movement in rental vacancy rate in either direction is slow. It took about five years in the late sixties for the vacancy rate to peak out, and similarly, it took five years for the vacancy rate to decline and hit the bottom.

The homeownership vacancy rate at 0.9 percent compared to the high level of 1.6 percent reached in 1963 again suggests a strong housing market. The movement up and down also takes several years and chances of overbuilding in for-sale houses in a short time, say one to two years, are not great.

The survey of Market Absorption published by the Census Bureau for new apartment units shows no change in the final quarter of 1971 compared to the previous quarter. New apartment units just completed still are being absorbed at about the same level, indicating strong apartment demand. ☺

# lines & numbers

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